Predicted Trajectory of the Black Cottonwood Forest Community Growing Along the Lower Boise River and its Effect on Water Quality and Beneficial Uses

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Idaho water quality standards are based on physical, chemical, and biological characteristics of water required to support beneficial uses. The moderation of ambient temperatures in rivers needed to support cold and warm water biota, two of several recognized beneficial uses, is dependent on shade from a canopy of overstory trees and understory shrubs growing along the margins of the floodplain. Overhanging vegetation and large woody debris in the channel also provides critical habitat for fish including living space, cover, and food to support their life history. Because of this the species diversity, age distribution, and reproductive capacity of the community of vegetation growing on the floodplain are important indicators of the ability of the river ecosystem to fully support cold and warm water biota.

This presentation will offer the data from a repeated inventory of riparian vegetation growing at eighteen sites along a 19.8 kilometer (12.3 mile) reach of the Lower Boise River, from Diversion Dam to Glenwood Bridge, upstream and within the urban boundaries of the City of Boise. The data first gathered in 1995 and again in 2018 show trends in: (a) species diversity, (b) presence/absence of both weedy and noxious species with the ability to compete with native species, and (c) the potential for sexual reproduction of black cottonwood (Populus trichocarpa), a keystone species within the riparian corridors of rivers in the Intermountain West.

Key findings include: (a) several tree and shrub species compete with black cottonwood for dominance in the overstory including tree-of-heaven (Ailanthus altissima), silver maple (Acer saccharinum), box elder (Acer negundo), Oregon ash (Fraxinus latifolia), Rocky Mountain juniper (Juniperus scopulorum), and false indigo (Amorpha fruticosa); (b) none compete with greater effect than false indigo because, in part, of its ability to fix nitrogen from the atmosphere and provide itself an essential nutrient; (c) the urban center of the City of Boise is an ecological demarcation between upper reaches where false indigo is sparse and lower reaches where it is common; (d) reproduction of black cottonwood from seed is largely limited to shoals and point bars below the ordinary high water line of the river where the parafluvial surface is comprised of cobble with a sandy sub-surface; (e) at the time of the 2018 survey, black cottonwood seedlings were largely restricted to an elevation at or near the water surface at flows that varied between 14 to 19 CMS (500 and 667 CFS); (f) because of their low-lying position in the active channel, these seedlings will likely be lost by scour and deposition during subsequent high flow events; and (g) black cottonwood whips that had survived the 2017 high flow event of 252

CMS (8,900 CFS) were seen at only one of the eighteen sample locations, and the stems of most were sheared and missing a central leader.

I conclude that the continued historic pattern of succession of the black cottonwood forest community - which requires periodic flood flow events to create a seedbed free of competition from other plant species, in topographic positions protected from scour and deposition, and gradual decline of river stage as seed germinates and seedlings mature - is at risk, shown previously in the literature, because of a departure from historic geomorphic process, like large scale floods, and shown in this study by competition from exotic, weedy plant species.